LOWER PASSAIC RIVER RESTORATION PROJECT

LOWER PASSAIC RIVER STUDY AREA RI/FS

HABITAT IDENTIFICATION SURVEY
ADDENDUM TO THE
QUALITY ASSURANCE PROJECT PLAN

SURFACE SEDIMENT CHEMICAL ANALYSES AND BENTHIC INVERTEBRATE TOXICITY AND BIOACCUMULATION TESTING

DRAFT

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Addendum Number 3

Prepared By:

Wind Ward environmental LLC

200 West Mercer Street, Suite 401
Seattle, Washington 98119

623673

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Acronyms

CPG	Cooperating Parties Group
ERA	ecological risk assessment
FSP2	Field Sampling Plan Volume 2
GPS	global positioning system
HHRA	human health risk assessment
ID	identification
LPR	Lower Passaic River
LPRRP	Lower Passaic River Restoration Project
LPRSA	Lower Passaic River Study Area
NJDEP	New Jersey Department of Environmental Protection
NJDOT	New Jersey Department of Transportation
NOAA	National Oceanic and Atmospheric Administration
PA	Partner Agencies
QAPP	quality assurance project plan
RM	river mile
SOP	standard operating procedure
USACE	US Army Corps of Engineers
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
Windward	Windward Environmental LLC

Introduction

This is an addendum to the *Lower Passaic River Restoration Project Quality Assurance Project Plan: Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing* (Windward 2009), hereafter referred to as the Benthic Quality Assurance Project Plan (QAPP). The Benthic QAPP was reviewed by the US Environmental Protection Agency (USEPA) and its Partner Agencies (PA)[1] and approved by USEPA on October 8, 2009. This addendum to the Benthic QAPP, hereafter referred to as Benthic QAPP Addendum No. 3, describes the habitat identification survey that will be conducted to qualitatively evaluate the shoreline and floodplains of the Lower Passaic River Study Area (LPRSA) in the summer (targeted for August 2010). Primary data to be collected are estimated linear measurements of shoreline features (e.g., riprap, aquatic vegetation, bulkhead), including observations on habitat types and human access (e.g., parks, docks), and evidence of human use of the LPRSA. This survey will include the tidal stretch of the LPRSA from the mouth to Dundee Dam, including the tidally influenced portions of the tributaries.

Benthic QAPP Addendum No. 3 includes updates to worksheets relevant to the habitat identification survey; it does not include updates to those worksheets or attachments that are not relevant to this habitat identification survey. Applicable and updated worksheets included in this addendum are presented below:

- Worksheet No. 1 contains the title and approval pages for the addendum.
- Worksheet No. 3 provides the distribution list.
- Worksheet No. 9 provides a record of relevant communication with USEPA/PA pertaining to the habitat identification survey.
- Worksheet No. 10 describes the specific problem definition.
- Worksheet No. 11 provides the project quality objectives.
- Worksheet No. 13 provides a summary of secondary data criteria and limitations.
- Worksheet No. 16 provides the schedule and timeline.
- Worksheet No. 21 provides the standard operating procedure (SOP) references table.
- Worksheet No. 29 provides a summary of project documents and records.
- Worksheet No. 37 provides the usability assessment.
- Attachment R provides procedures for the habitat identification survey.
- Attachment S provides the LPRSA Habitat Identification Survey Form.

[1] The Partner Agencies include the US Army Corps of Engineers (USACE), New Jersey Department of Environmental Protection (NJDEP), New Jersey Department of Transportation (NJDOT), National Oceanic and Atmospheric Administration (NOAA), and the US Fish and Wildlife Service (USFWS).

QAPP Worksheet No. 1. Title and Approval Page

Addendum to the *Quality Assurance Project Plan for Surface Sediment Chemical Analyses and Benthic Invertebrate Toxicity and Bioaccumulation Testing*

Document Title

Windward Environmental LLC (Windward)

Lead Investigative Organization

Maryann Welsch, Windward

Preparer's Name and Organizational Affiliation

200 West Mercer St., Suite 401, Seattle, WA 98119, 207.899.1369, maryannw@windwardenv.com

Preparer's Address, Telephone Number, and E-mail Address

06/04/10

Preparation Date (mm/dd/yy)

Investigative Organization's Project Manager:

Signature

Lisa Saban, Windward, Date

Printed Name/Organization/Date

Investigative Organization's Task QA/QC Manager:

Signature

Tad Deshler, Windward, Date

Printed Name/Organization/Date

Project Coordinators:

Signature

Bill Potter, de maximis, inc., Date

Printed Name/Organization/Date

QAPP Worksheet No. 1. Title and Approval Page

	Signature
	Robert Law, de maximis, inc., Date
	Printed Name/Organization/Date

Approval Signatures:

USEPA Project Manager	
Approval Authority	Signature
	Stephanie Vaughn, USEPA, Date
	Printed Name/Title/Date
USEPA Project QA Officer	
Approval Authority	Signature
	William Sy, USEPA, Date
	Printed Name/Title/Date

QAPP Worksheet No. 3. Distribution List

QAPP Recipients	Title	Organization	Telephone Number	E-mail Address
Lisa Saban	Investigative Organization Project Manager	Windward	206.812.5429	lisas@windwardenv.com
Mike Johns	Technical Advisory Team Member	Windward	206.812.5418	mikej@windwardenv.com
Tad Deshler	Investigative Organization Task QA/QC Manager	Windward	206.812.5406	tad@windwardenv.com
Kimberley Goffman	Investigative Organization Information Manager	Windward	206.812.5414	kimg@windwardenv.com
Thai Do	Field Coordinator/Site Safety and Health Officer	Windward	206.812.5407	thaid@windwardenv.com
Angelita Rodriquez	Field Coordinator/Site Safety and Health Officer (alternate)	Windward	512.436.8645	angelitar@windwardenv.com
Maryann Welsch	Investigative Organization Field Coordinator	Windward	207.899.1369	maryannw@windwardenv.com
Mara Irby	Field Personnel	Windward	206.812.5443	marai@windwardenv.com
Bill Potter/Robert Law	Project Coordinators	de maximis, inc.	908.735.9315	otto@demaximis.com rlaw@demaximis.com
William Hyatt	Coordinating Counsel	K&L Gates	973.848.4045	william.hyatt@klgates.com
Jeff Clemens	Boat Operator	Aqua Survey, Inc.	908.347.3927	clemens@aquasurvey.com
Stephanie Vaughn	USEPA Project Manager	USEPA Region 2	212.637.3914	vaughn.stephanie@epamail.epa.gov
Chuck Nace	USEPA Risk Assessor	USEPA Region 2	212.637.4164	nace.charles@epa.gov
Lisa Baron	Project Manager	USACE	917.790.8306	Lisa.A.Baron@usace.army.mil
Janine MacGregor	Project Coordinator	NJDEP	609.633.0784	Janine.MacGregor@dep.state.nj.us

QAPP Worksheet No. 3. Distribution List

QAPP Recipients	Title	Organization	Telephone Number	E-mail Address
Timothy Kubiak	Assistant Supervisor of Environmental Contaminants	USFWS	609.646.9310, ext. 26	tim_kubiak@fws.gov
Reyhan Mehran	Coastal Resource Coordinator	NOAA	212.637.3257	reyhan.mehran@noaa.gov

QAPP Worksheet No. 9. Project Scoping Session Participants Sheet

Project Name:	Lower Passaic River Restoration Project (LPRRP) Ecological and Human Health Risk Assessment
Site Name:	LPRSA
Projected Date(s) of Sampling:	August 16-19, 2010
Site Location:	LPRSA
Project Manager:	Bill Potter/Robert Law, de maximis, inc.
Date of Session:	January 14 and 15, 2009
Scoping Session Purpose:	Workshop to discuss the ecological risk assessment (ERA), the human health risk assessment (HHRA), and the implementation of Field Sampling Plan Volume 2 (FSP2) in 2009.

Participants: USEPA, PA (NOAA, USFWS, NJDEP, NJDOT, USACE), Cooperating Parties Group (CPG), de maximis, inc., AECOM, Windward

Name	Affiliation	Phone No.	E-mail Address
AmyMarie Accardi-Dey	The Louis Berger Group, Inc.	914.798.3712.	aaccardidey@louisberger.com
Adam Ayers	GE	518.862.2722	Adam.Ayers@ge.com
Lisa Baron	USACE	917.790.8306	Lisa.A.Baron@usace.army.mil
Thai Do	Windward Environmental	206.812.5407	thaid@windwardenv.com
Kristen Durocher	AECOM	603.528.8916	kristen,durocher@aecom.com
Clifford Firstenberg	Tierra Solutions, Inc.	757.258.7720	cefirstenberg@cox.net
Gary Fisher	Alcatel-Lucent USA	908.582.5791	gmfisher@lucent.com
Nancy Hamill	NJDEP	609.633.1348	nancy.hamill@dep.state.nj.us
Timothy Iannuzzi	ARCADIS	410.295.1205	tim.iannuzzi@arcadis-us.com
Mike Johns	Windward Environmental	206.812.5418	mikej@windwardenv.com
Timothy Kubiak	USFWS	609.646.9310	tim_kubiak@fws.gov
Robert Law	de maximis, inc.	908.735.9315	rlaw@demaximis.com
Janine MacGregor	NJDEP	609.633.0784	janine.macgregor@dep.state.nj.us
Reyhan Mehran	NOAA ORR	212.637.3257	reyhan.mehran@noaa.gov
Cate Mulvey	USACE	917.790.8216	Catherine.j.mulvey@usace.army.mil
Chuck Nace	USEPA	212.637.4164	nace.charles@epa.gov
Marian Olsen	USEPA	212.637.4313	olsen.marian@epa.gov
Jenny Phillips	AECOM	970.530.3432	jenny.phillips@aecom.com
Bill Potter	de maximis, inc.	908.735.9315	otto@demaximis.com

QAPP Worksheet No. 9. Project Scoping Session Participants Sheet

Norm Richardson	Battelle	617.869.1417	richardsonn@battelle.org
Pam Rodgers	Battelle	614.424.4624	rodgersp@battelle.org
Angelita Rodriquez	Windward Environmental	512.436.8645	angelitar@windwardenv.com
Betsy Ruffle	AECOM	978.589.3071	betsy.ruffle@aecom.com
Lisa Saban	Windward Environmental	206.812.5429	lisas@windwardenv.com
John Samuelian	AMEC	207.879.4222	john.samuelian@amec.com
Karen Saucier	RMT, Inc.	864.234.9307	Karen.Saucier@rmtinc.com
Ralph Stahl, Jr.	DuPont	302.892.1369	Ralph.G.Stahl-JR@usa.Dupont.com
Lucinda Tear	Windward Environmental	206.378.1364	lucindat@windwardenv.com
Carlie Thompson	Tierra Solutions, Inc.	732.246.5849	carlie.thompson@tierra-inc.com
Len Warner	Malcolm Pirnie, Inc.	914.641.2972	lwarner@pirnie.com
Maryann Welsch	Windward Environmental	207.899.1369	maryannw@windwardenv.com
Peter Weppler	USACE-PL	917.790.8634	peter.m.weppler@usace.army.mil
Alice Yeh	USEPA	212.637.4427	yeh.alice@epa.gov

January 2009 Risk Assessment and FSP2 Field Sampling Program Goals Meeting	
Purpose:	A meeting to discuss the ERA, HHRA, and FSP2 was held January 14 and 15, 2009, at K&L Gates in Newark, New Jersey. The purpose of this meeting was to address the components of the ERA and HHRA and discuss the goals of the 2009 FSP2 field sampling program.
Relevant Items Discussed:	• USEPA/PA and CPG agreed that USACE has completed a majority of FSP2 work required as part of the LPRSA habitat survey. • USACE to provide maps of completed habitat evaluations to CPG. • CPG will evaluate USACE habitat evaluation to determine what data gaps may remain for habitat work.

QAPP Worksheet No. 10. Problem Definition

The problem to be addressed by the project:
A habitat identification survey will be conducted to characterize the shoreline and associated floodplain habitat of the LPRSA. Previous investigations focused on the lower portion of the LPRSA (River Mile [RM] 1 to RM 7) (Tierra Solutions 2002); therefore, limited information is available on the habitat characteristics and the shoreline features of the upper portion of the LPRSA, from approximately RM 7 to RM 17.4. Data collected during the habitat identification survey will be used to estimate the linear extent of habitat types (e.g., low marsh) and/or shoreline features (e.g., bulkhead, riprap) and to characterize human access points and human activities (or evidence thereof) observed throughout the LPRSA.
The environmental questions being asked:
The specific question defined for the habitat identification survey is: "What habitat types and/or what shoreline features are present on each bank along the 17.4 miles of the LPRSA and its tributaries?"
Observations from any site reconnaissance reports:
Field reconnaissance for habitat identification was conducted on July 24-25, 2007. Aqua Survey, Inc., was contracted to tour the LPRSA by boat on July 25, 2007, to preview shoreline and habitat conditions. Observations of shoreline features and characteristics from approximately RM 6 to RM 15 were made during the boat tour. A summary of observations is as follows: • Bulkhead dominated the west bank of the river for several miles because of the presence of Route 21 adjacent to the river. • The east bank appeared to be dominated by vegetation, most often growing over armored banks (i.e., riprap). • Areas of mudflat and stands of aquatic vegetation (e.g., *Phragmites*) were observed in a few locations on the east bank, in particular close to parks (e.g., Riverside County Park South). • Shoreline features varied vertically and were dependent on the elevation of the tide at the time of observation. • Portions of the habitat identification survey might need to be conducted by small boat to be able to access the shallow water area along the shoreline and above the confluence with the Saddle River (RM 15). Boat access is not possible or is very limited on all of the Lower Passaic River (LPR) tributaries.

QAPP Worksheet No. 10. Problem Definition

A synopsis of secondary data or information from site reports:

Previous efforts to characterize the shoreline habitats were largely focused on RM 1 to RM 7 of the LPRSA. Tierra Solutions (2002) visually assessed the shoreline and delineated four types of shoreline features in fall 1999 and spring 2000. Of the 67,770 linear feet of shoreline habitat: 52% was bulkhead, 30% was riprap, 12% was mixed vegetation (riprap or bulkhead interspersed with vegetation), and 6% was emergent aquatic vegetation. These percentages vary greatly among the various reaches of the river. A survey of the river bottom noted that was is composed of 8% intertidal mudflats and 92% subtidal bottoms (Iannuzzi and Ludwig 2004).

Based on wetland mapping, approximately 88% of the historical wetlands in the Newark Bay estuary have been lost since the early 1800s (Tierra Solutions 2002). Three wetland areas that provided functional habitats and support biological production were noted: marshes located on Lawyer's Creek near the confluence of the bay with the Passaic River (near RM 1), a small marsh downstream of the Worthington Avenue combined sewer overflow (near RM 3), and a habitat complex that included intertidal mudflat near RM 6 (Iannuzzi and Ludwig 2004).

A review of LPR habitat data was conducted by TAMS Consultants, Inc., and Malcolm Pirnie (2004). The focus of this literature review was on available habitat data for each of three LPRSA segments: RM 0 to RM 1 (Kearny Point), RM 1 to RM 7, and RM 7 to RM 17. Available data for all areas suggested that mudflat habitat was highly limited throughout the LPRSA. A USACE study (USACE 1987; as cited in TAMS and Malcolm Pirnie 2004) reported that the site was used as a stopover point for migrating waterfowl. This same study reported that the limited wetland habitat associated with the LPRSA was used by various species, including raccoon, eastern gray squirrel, eastern cottontail rabbit, and opossum.

An assessment conducted by Shisler et al. (2008) examined existing habitats of the 17.4-mile LPRSA to define ecological benchmarks, which are site-specific biological characteristics of the estuarine habitats present in the LPRSA and could be used in future restoration planning efforts. Habitats were evaluated during a visual survey (conducted by boat) in October 2005 and characterized in terms of vegetation, bathymetry, substrate, and location relative to salinity gradient. Physical and ecological attributes of each habitat type were characterized to define ecological benchmarks that could be used to define restoration opportunities in the LPRSA. The benchmarks that Shisler et al. (2008) defined for the LPRSA were predominantly located in depressional areas and included locations of salt marsh cordgrass near the mouth of the LPRSA and isolated, small patches of wetland vegetation frequently located on the inside of meander bends. In addition, in the upper reaches of the LPRSA, benchmarks were located in sections of the river that were protected from river currents (e.g., on the inside of curve of meander bends or near in-stream structures). Vegetation associated with upstream benchmarks included patches of arrow arum and swamp smartweed. Shisler et al. (2008) concluded that the ecological services baseline of the river was low as a result of impacts associated with the urban environment; however, the ecological benchmarks defined by their study offer a range of options for restoration throughout LPRSA.

QAPP Worksheet No. 10. Problem Definition

A riparian vegetation survey was conducted in the LPRSA in fall 2007 and spring/summer 2008 (USACE et al. 2008). Vegetation was surveyed at 23 potential restoration sites on the main stem of the LPRSA (USACE vegetation sampling plots are presented on Figure 1), at 4 sites on the tributaries, and at 3 reference locations (2 reference sites were located outside of the LPRSA, but one was at a wetland on the main stem in Harrison). The survey parameters included percent cover of trees, shrubs, vines, and herbaceous vegetation, tree basal area, identification of plant species, and determination of native or non-native classification for each species (USACE et al. 2008). In addition to the vegetation survey, bio-benchmark surveys were conducted at three locations on the main stem, and formal wetland delineations were conducted at these locations and at the reference area in Harrison. The bio-benchmark surveys involved determining precise vertical elevations and key vegetation, soil, and hydrology characteristics for existing habitat types (e.g., wetlands) (USACE et al. 2008).

The results of this survey were summarized for the freshwater (identified as RM 10 to RM 17.4), transitional (identified as RM 6 to RM 10), and brackish (identified as RM 0 to RM 6) sections of the LPR. For the freshwater section, dominant tree species included American elm, black locust, cottonwood, and silver maple; and dominant shrub species included multiflora rose, red osier dogwood, and saplings of American elm, green ash, tree of heaven and Norway maple (USACE et al. 2008). Dominant herbaceous plants were Japanese knotweed and white snakeroot. Similar dominant species were observed in the transitional and brackish sections. Additional dominant species in the brackish section included common reed (herbaceous) and marsh elder (shrub). Poison ivy, box elder, red osier dogwood, white mulberry, and white snakeroot were also common in the transitional section. Sites were also evaluated on the Saddle River, Third River, and Second River. Similar species were observed at the tributary sites; Japanese knotweed dominated the herbaceous layer at all sites on the tributaries.

Wetland delineations were conducted at three locations in the LPRSA (at RM 3.9, RM 7.7, and RM 10.9) and one location on Toney's Brook (USACE et al. 2008). The wetlands delineated were estuarine intertidal with native emergent vegetation and riverine intertidal with native and invasive emergent vegetation. Bio-benchmark data were also collected and included vertical elevations associated with the presence of native or non-native, invasive vegetation (e.g., lowest and highest elevations of *Spartina alterniflora* communities at locations in the brackish section).

Project decision conditions:

The conditions for project decisions (i.e., those decisions that may require communication between CPG and USEPA during the habitat identification survey) include the need change the proposed survey plan as a result of field conditions encountered or to delay or suspend surveying because of hazardous weather conditions. The CPG will immediately suspend operations under extreme weather and/or environmental conditions that are a threat to worker health and safety.

QAPP Worksheet No. 11. Project Quality Objectives/Systematic Planning Process Statements

What will the data be used for?
The information collected during the habitat identification survey described in this QAPP addendum will be used to provide qualitative, descriptive information on the types of habitats present and conditions of the shoreline throughout the LPRSA. In addition, the results will complement relevant existing site-specific habitat and shoreline surveys including the Tierra Solutions 1999-2000 habitat characterization survey (Tierra Solutions 2002), the ecological benchmarking survey presented by Shisler et al. (2008), and the vegetation sampling, wetland delineation surveys, and bio-benchmark surveys conducted by the USACE et al. (2008). This information will be used to support the ERA and HHRA in terms of identifying habitat availability and exposure areas for bird and mammal populations and identifying exposure areas suitable for human populations and activities (i.e., confirming the presence and extent of accessible sediment areas and human access points) in the LPRSA, including the tributaries.
What types of data are needed?
Data collected during the habitat identification survey will include the locations and approximate boundaries of habitat types and/or shoreline features along each bank of the LPRSA (categories are described in response to "How will the data be collected" on this worksheet). Additional notes on habitat characteristics will include (when possible) plant community type, dominant plant species, and habitat features (e.g., overhanging vegetation, large woody debris). Features related to human access and shoreline use will also be documented, including shoreline features (e.g., parks, docks) and evidence of human use. The presence and approximate areal extent of mudflats and accessible sediment areas (defined for human health exposure) as shown on Figure 1 will be confirmed.
How "good" do the data need to be in order to support the environmental decision?
The habitat identification survey will provide a qualitative description of the shoreline of the LPRSA including the main stem and the tributaries within the LPRSA boundaries. The primary data to be collected are the estimated linear measurements (in feet) of shoreline condition and/or habitat types. The boundaries of each shoreline condition and/or habitat type (categories are described in response to "How should the data be collected" on this worksheet) will be estimated using the best professional judgment of the field personnel.
How many data are needed?
Qualitative observations of the shoreline features and habitat types of both banks of the main stem and tributaries of the LPRSA will be made during a continuous survey of the shoreline; the locations of boundaries between categories (i.e., upstream and downstream boundaries) will be estimated. Boundaries based on depth (e.g., between intertidal and subtidal habitats) will be estimated based on bathymetry.

QAPP Worksheet No. 11. Project Quality Objectives/Systematic Planning Process Statements

Where, when, and how should the data be collected/generated?

Field survey procedures are described in the SOP—LPRSA Habitat Identification Survey (Attachment R of this addendum), as well as in Attachment B: SOP—Locating Sample Points Using a Hand-Held Global Positioning System (GPS), Attachment C: SOP—Locating Sample Points Using a Boat-Mounted Global Positioning System (GPS), and Attachment H: SOP—Documenting Field Activities in the Benthic QAPP (Windward 2009). Observations will be recorded on the LPRSA Habitat Identification Survey Form (Attachment S) and in the field notebook as appropriate.

Where should the data be collected?

The habitat identification survey will be conducted along the shoreline (both banks) of the LPRSA. This will include the main stem of the river, from RM 0 to RM 17.4, and the tributaries where access is possible. Access to some tributaries may be restricted or not possible (e.g., First River, which is piped underground). Access to the main stem of the LPRSA may also be restricted in areas where the river is too shallow for travel by boat and not passable on foot (i.e., wading) because of obstacles such as hazardous rocky substrates. Where access is not possible, remote sources of information will be queried (e.g., 2007 LPRSA aerial photograph survey (GEOD 2007), existing geographical information system data, Google™ Earth) to estimate the boundaries of shoreline features and/or habitat types.

In addition, all habitats that are contiguous with habitats in the floodplain (e.g., wetlands, riparian forest) will be documented during the habitat identification survey, and the areal extent of that habitat will be approximated using remote sources of information (e.g., Google™ Earth, USFWS National Wetland Inventory) following the completion of the survey.

When should the data be collected?

The habitat identification survey will be conducted over 4 days targeted for August 2010 (see Worksheet No. 16 for the schedule). The schedule for the survey on any given day will be determined based on predicted tidal height and boat access throughout the LPRSA (e.g., moving the boat under bridges and as far upstream as possible). Efforts will be made to cover mudflat/accessible sediment areas during low tide to capture the maximum area of exposure.

How should the data be collected?

The field procedures for the habitat identification survey are described in Attachment R: SOP—LPRSA Habitat Identification Survey. The survey will be conducted primarily by boat from which field personnel will characterize the shoreline features using four general categories: aquatic vegetation, mixed vegetation, bulkhead, and riprap. These categories are the same as those used during the 1999-2000 habitat characterization survey (Tierra Solutions 2002) and are defined as follows:

- Aquatic vegetation represents shoreline where emergent vegetation is present (e.g., *Spartina alterniflora*, *Phragmites*). Tierra Solutions (2002) reported that in the lower portion of the LPRSA, narrow bands of vegetation were often present near the top of the intertidal zone, typically with intertidal mudflat below.

QAPP Worksheet No. 11. Project Quality Objectives/Systematic Planning Process Statements

- Mixed vegetation represents shoreline where riprap or bulkhead and emergent vegetation or overhanging vegetation are present in roughly equal proportions.
- Bulkhead represents shoreline where a vertical face composed of wood timbers, metal sheet pile, or large stone blocks is present.
- Riprap represents shoreline with sloped banks that are covered by cobble to boulder-sized stones and/or concrete rubble.

The upstream and downstream boundaries of each category will be determined based on visual inspection of the shoreline and the best professional judgment of the field personnel. The global positioning system (GPS) coordinates of each boundary will be recorded based on methods described in Attachments C: SOP—Locating Sample Points Using a Boat-Mounted Global Positioning System (GPS) of the Benthic QAPP (Windward 2009). The boat will proceed along the shoreline in a pre-determined direction, and field personnel will make a continuous video to document the shoreline.

The presence of mudflats and accessible sediment areas (defined for human health exposure) as shown on Figure 1 will be confirmed during the habitat identification survey by field personnel, who will note the approximate boundaries of exposed mudflat and accessible sediment areas, including the boundaries along the shoreline (i.e., upstream and downstream boundaries) and the boundary between intertidal (i.e., areas that are exposed) and subtidal submerged habitats. The mudflats and accessible sediment areas on Figure 1 were delineated based on bathymetry data collected during the low-resolution coring effort (AECOM 2010), bathymetry and sediment texture data presented in the draft geochemical evaluation (Malcolm Pirnie 2006), and CPG 2007 aerial photographs of the LPRSA (GEOD 2007). For ecological exposure, mudflats are areas less than 4.5 feet deep, which is approximately half the mean tidal range of mean low water to mean high water, plus 2 feet, and have less than 5° slope with a substrate of silt or sand. The exception is the mudflat at Kearny Point for which bathymetry or substrate data are not available. For human health exposure, accessible sediment is defined in the *LPRSA Human Health and Ecological Risk Assessment Streamlined 2009 Problem Formulation* (Windward and AECOM 2009) as areas less than -2 feet mean low water below RM 15; above RM 15, accessible sediment areas were estimated from CPG 2007 aerial photographs (GEOD 2007). GPS coordinates, photographs, and notes on habitat features of the mudflat/accessible sediment areas will be recorded on the LPRSA Habitat Investigation Survey Form (Attachment S).

Additional information will be collected, as appropriate, to describe the habitat types and human access points encountered along the shoreline. For example, for all aquatic vegetation or mixed vegetation shoreline features, the plant community type, the dominant plant species observed, and any habitat features (e.g., large woody debris) will be documented when possible. Any fauna observed will also be documented. Information on human accessibility, mudflat and accessible sediment characteristics (e.g., slope, composition), shoreline characteristics, and evidence of human use will be recorded. As described above (in response to “Where should the data be collected?”), all habitats that are contiguous with habitats in the floodplain will also be documented.

In locations where access by boat is not possible, access on foot by wading or walking along the shoreline will be attempted.

QAPP Worksheet No. 11. Project Quality Objectives/Systematic Planning Process Statements

Accessing the shoreline in these areas will only be attempted where permissible (i.e., public-access points). Once access is gained, the shoreline will be surveyed on foot in the same manner as described above for boat access: upstream and downstream boundaries of shoreline features will be determined, boundary GPS coordinates will be documented (based on methods presented in Attachment B: Protocol Modification Form of the Benthic QAPP (Windward 2009)), and notes on habitat types will be recorded. For locations on the main stem or on tributaries of the LPRSA where access is not permissible or possible, remote sources of information will be queried to fill in gaps of shoreline features and habitat types. These sources may include existing CPG 2007 aerial photography (GEOD 2007), GIS data (i.e., bathymetry, sediment texture), Google™ Earth, and USFWS National Wetland Inventory maps. All changes to the proposed survey plan as a result of field conditions will be discussed with USEPA and CPG technical coordinators or project managers.
Who will collect and generate the data?
Windward will provide the field sampling coordination and the field personnel required to conduct the habitat identification survey. Windward will be supported by its contractor, Aqua Survey, Inc., as well as de maximis, inc., and AECOM field personnel, as required.
How will the data be reported?
Updates will be communicated (e.g., via telephone conversation, e-mail) to CPG project managers and project coordinators. An electronic database that includes the coordinates for the boundary locations, the times of the survey, and all other information collected on the LPRSA Habitat Identification Survey Form will be maintained. A data summary report that presents the shoreline features and habitat types of the LPRSA, including areas surveyed on the tributaries, will be provided within 90 working days after the completion of the habitat identification survey. The data summary reports will detail any modifications to the proposed sampling plan outlined in this Benthic QAPP Addendum No. 3.
How will the data be archived?
Data records, forms, and notes will be scanned and stored electronically in a project file. Hard copies will be archived at Windward's main office in Seattle, Washington. Similarly, once the data reports have been issued, they will be archived electronically and as hard copies. All digital photos and videotapes produced during this effort will be archived and stored in an appropriate manner to ensure long-term stability of the media. Video footage will be transferred to DVD, and digital photos will be transferred to CD for long-term storage in the library at Windward's main office in Seattle, Washington.

QAPP Worksheet No. 13. Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation/collection dates)	How Data Will Be Used	Limitations on Data Use
Habitat characterization survey data	Tierra Solutions. 2002. Passaic River Study Area habitat characterization. September 26, 2002. Tierra Solutions, Inc., Newark, NJ.	Tierra Solutions, habitat characterization survey, 1999-2000	Continuous video survey of RM 1 to RM 7 of LPRSA will be used to inform (e.g., the same shoreline categories will be used) and complement data collected during the 2010 survey.	The survey focused on the lower portion of the LPRSA.
	Iannuzzi TJ, Ludwig DF. 2004. Historical and current ecology of the Lower Passaic River. Urban Habitat 2(1):3-30.	Iannuzzi and Ludwig, habitat characterization survey, 1999-2000	Results reported may provide additional information on habitat availability and habitat use by fauna.	Habitat survey information focused on the lower portion of the LPRSA.
Vegetation sampling and biological or ecological benchmark data	Shisler JK, Iannuzzi TJ, Ludwig DF, Bluestein PJ. 2008. Ecological benchmarking in an urbanized estuarine river system. Ecol Restor 26(3):235-245.	Arcadis, Tierra Solutions, ecological benchmark survey, 2005	Survey data may provide additional information on plant community types, dominant species, and habitat features.	Purpose of field effort did not include a continuous shoreline survey; therefore, data for entire shoreline of LPRSA are not available.
	USACE, USEPA, NJDOT. 2008. Lower Passaic River Restoration Project vegetation sampling, wetland delineation and bio-benchmark report. US Army Corps of Engineers New York District; US Environmental Protection Agency Region 2, New York; New Jersey Department of Transportation.	USACE, vegetation sampling, wetland delineation, and bio-benchmark survey, 2007-2008	Survey data may provide additional information on plant community types, dominant species, and habitat features.	Field effort did not include a continuous shoreline survey; therefore, data for entire shoreline of LPRSA are not available.

QAPP Worksheet No. 13. Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation/collection dates)	How Data Will Be Used	Limitations on Data Use
Predicted tide tables	NOAA online tide data available at (http://tidesandcurrents.noaa.gov/tides09/)	NOAA, tide predictions, 2009	Tide predictions will be used to determine when stations can be accessed by boat.	Raw tidal elevation data obtained from the NOAA website have not been subjected to the National Ocean Service's quality assurance/quality control procedures and do not meet the criteria and standards of official National Ocean Service data. They are released for limited public use as preliminary data to be used only with appropriate caution.
Sediment texture maps	Malcolm Pirnie. 2006. LPRRP. Draft geochemical evaluation (step 2). Prepared for USEPA Region 2 and USACE. Malcolm Pirnie, Inc., White Plains.	Aqua Survey. Vector digital data, April 21, 2005 to June 16, 2005, as cited in Malcolm Pirnie (2006)	Sediment texture maps will be used to identify areas with fine-grained and coarse-grained sediments.	Side scan sonar survey data are limited to general grain size characterization. Sediment texture map coverage ends at ~RM 16.1.

QAPP Worksheet No. 13. Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation/collection dates)	How Data Will Be Used	Limitations on Data Use
Bathymetry maps	Malcolm Pirnie. 2006. LPRRP. Draft geochemical evaluation (step 2). Prepared for USEPA Region 2 and USACE. Malcolm Pirnie, Inc., White Plains, NY.	Aqua Survey. Vector digital data, April 21, 2005, to June 16, 2005, as cited in Malcolm Pirnie (2006)	Bathymetry maps will be used to help identify intertidal and subtidal areas.	Multi-beam bathymetric data may be incomplete in places at shoreline and near structures.
	AECOM. 2010. Low resolution coring characterization summary. Lower Passaic River Study Area RI/FS. Draft. Prepared for Lowe Passaic River Cooperating Parties Group. AECOM, Newark, NJ.	AECOM, Multi-beam bathymetry data, 2007	Bathymetry maps will be used to help identify intertidal and subtidal areas.	Multi-beam bathymetric data may be incomplete in places at shoreline and near structures and above approximately RM 16 where boat access is restricted.
Aerial photography	GEOD. 2007. GIS Metadata for the Lower Passaic River Study Area. Prepared by GEOD Corporation for the CPG. May 15, 2007.	CPG, Aerial photography, 2007	Aerial photography will be used for information on shoreline condition and habitat types for areas where access during the survey may be restricted.	Information on shoreline features or habitat types interpreted from aerial photography will not be as accurate as field observations.

QAPP Worksheet No. 16. Project Schedule/Timeline Table

Activities	Organization	Date (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date of Initiation	Anticipated Date of Completion		
Prepare Benthic QAPP Addendum No. 3 and submit to USEPA	Windward	03/01/10	06/04/10	Benthic QAPP Addendum No. 3	06/04/10
Conduct habitat identification survey	Windward	8/16/10	8/19/10	See below	See below
Prepare and deliver habitat identification survey data report to USEPA	Windward	Upon completion of survey event	90 days after survey is complete	Habitat identification survey data report	90 days after survey is complete

QAPP Worksheet No. 21. Project Sampling SOP References Table

SOP Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
11[a]	SOP – LPRSA Habitat Identification Survey	Windward	Video camera, digital camera	N	Attachment R

[a] Next sequential number in the Benthic QAPP, taking into account any SOPS in Addenda Nos. 1 and 2.

LPRSA – Lower Passaic River Study Area

QAPP – quality assurance project plan

SOP – standard operating procedure

QAPP Worksheet No. 29. Project Documents and Records Table

Survey Documents and Records
Onsite Analysis Documents and Records
Habitat Identification Survey Form
Deliverables
Habitat identification survey data report

QAPP Worksheet No. 37. Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:
All observations made during the habitat identification survey will be considered usable as long as they are made according to the methods described in the applicable SOPs (Attachment R: SOP—LPRSA Habitat Identification Survey) and Attachment B: SOP—Locating Sample Points Using a Hand-Held Global Positioning System (GPS), Attachment C: SOP—Locating Sample Points Using a Boat-Mounted Global Positioning System (GPS), and Attachment H: SOP—Documenting Field Activities in the Benthic QAPP (Windward 2009). No formal data usability assessment report will be prepared for the habitat identification survey. Any deviations from the SOPs will be documented, as appropriate, in the field notebook and on the Protocol Modification Form (Attachment A of the Benthic QAPP (Windward 2009)) and also approved by USEPA or its authorized representative.

References

AECOM. 2010. Low resolution coring characterization summary. Lower Passaic River Study Area RI/FS. Draft. Prepared for Lowe Passaic River Cooperating Parties Group. AECOM, Newark, NJ.

GEOD. 2007. GIS metadata for the Lower Passaic River Study Area. Prepared for the Cooperating Parties Group. May 15, 2007. GEOD Consulting, Burlington, MA.

Iannuzzi TJ, Ludwig DF. 2004. Historical and current ecology of the Lower Passaic River. Urb Habit 2(1):3-30.

Malcolm Pirnie. 2006. Lower Passaic River Restoration Project. Draft geochemical evaluation (step 2). Prepared for US Environmental Protection Agency Region 2 and US Army Corps of Engineers. Malcolm Pirnie, Inc., White Plains, NY.

Shisler JK, Iannuzzi TJ, Ludwig DF, Bluestein PJ. 2008. Ecological benchmarking in an urbanized estuarine river system. Ecol Restor 26(3):235-245.

TAMS, Malcolm Pirnie. 2004. Lower Passaic River Restoration Project: Draft final biological literature review. Prepared for US Environmental Protection Agency, US Army Corps of Engineers, and New Jersey Department of Transportation/Office of Maritime Resources. TAMS, Bloomfield, NJ, and Malcolm Pirnie, Inc., White Plains, NY.

Tierra Solutions. 2002. Passaic River Study Area habitat characterization. September 26, 2002. Tierra Solutions, Inc., Newark, NJ.

USACE. 1987. Passaic River Basin, New Jersey and New York. Phase I - general design memorandum: Flood protection feasibility, Main Stem Passaic River, main report and environmental impact statement. US Army Corps of Engineers, New York District, NY.

USACE, USEPA, NJDOT. 2008. Lower Passaic River Restoration Project vegetation sampling, wetland delineation and bio-benchmark report. US Army Corps of Engineers New York District; US Environmental Protection Agency Region 2, New York; New Jersey Department of Transportation.

Windward. 2009. Lower Passaic River Restoration Project. Lower Passaic River Study Area RI/FS. Quality Assurance Project Plan: Surface sediment chemical analyses and benthic invertebrate toxicity and bioaccumulation testing. Final. Prepared for Cooperating Parties Group, Newark, New Jersey. Windward Environmental LLC, Seattle, WA.

Windward, AECOM. 2009. LPRSA human health and ecological risk assessment streamlined 2009 problem formulation. Final. Prepared for Cooperating Parties Group, Newark, New Jersey. Windward Environmental LLC, Seattle, WA; AECOM, Inc., Westford, MA.

Attachment R: SOP—LPRSA Habitat Identification Survey

I. Purpose

The purpose of this standard operating procedure (SOP) is to define the procedures to be followed for conducting the Lower Passaic River Study Area (LPRSA) habitat identification survey, specifically the equipment required and the field methods necessary for characterizing the shoreline and habitat types of the LPRSA. The methods described in this SOP are based on SOP No. 11 of the *Passaic River Study Area Ecological Sampling Plan* (Tierra Solutions 1999).

II. Preparation for Sampling

Benthic QAPP Addendum No. 3 identifies the LPRSA for this habitat identification survey as both banks (from water's edge to the top of the bank, or if the top of the bank is obscured, to the uppermost visible point near the top of the bank) of the LPRSA from River Mile (RM) 0 to RM 17.4 and the tributaries where access to the shoreline is possible. The field team is responsible for reviewing the QAPP prior to conducting field activities and ensuring that all field equipment is available and in acceptable condition.

III. Equipment and Supplies

- Video camera
- Digital camera
- Global positioning system (GPS) unit (specifications and procedures in Attachment B: SOP—Locating Sample Points Using a Hand-Held Global Positioning System (GPS) and Attachment C: SOP—Locating Sample Points Using a Boat-Mounted Global Positioning System (GPS) of the Benthic QAPP (Windward 2009)
- Field guides (i.e., vegetation)
- Binoculars
- Site maps
- Tide tables
- Field forms, log book, waterproof pens, pencils, and grease pencils
- Batteries for cameras (size will depend on the device)

IV. Field Procedure for Surveying by Boat

The habitat identification survey will be conducted primarily by boat (see Section V for field procedures if surveying on foot) using a video camera to record continuous video of the shoreline. This video will be narrated by Windward ecologists to document all observations made on shoreline and habitat. Specific tasks are as follows:

A. At the start of each survey period (i.e., day or part of day, such as morning or afternoon), field personnel will record the starting point (including GPS location), date, time, and tidal information (projected height and time of low and high tide for that day) on the LPRSA Habitat Identification Survey Form (Attachment S).

B. The shoreline will be videotaped from the boat, and the following observations will be recorded on the LPRSA Habitat Identification Survey Form:

1. Coordinates of approximate downstream and upstream boundaries of each shoreline category (i.e., aquatic vegetation, mixed vegetation, bulkhead, and riprap)
2. Observations of plant community types, dominant plant species of the herbaceous, shrub, or tree stratum present (where feasible to determine identification), and habitat features (e.g., large woody debris, snags, brush, overhanging vegetation, or pools)
3. Observations of habitat types that are contiguous with floodplain habitats (e.g., wetland, forested riparian)
4. Coordinates of landmarks, such as bridges and major roads
5. Observations of fauna present, including species identification if possible
6. Characterization of mudflat/accessible sediment areas (e.g., approximate upstream and downstream boundaries, approximate boundary between exposed mudflat and subtidal shallow water, slope, substrate)
7. Information on human access and activities, including human access points (e.g., parks, docks, boat ramps) and evidence of human use
8. Records of all digital photographs taken, including location, time, and subject

C. At the end of each survey period, field personnel will record the ending point (including GPS location), date, and time.

V. Field Procedure for Surveying on Foot

Some areas of the LPRSA may not be accessible by boat, including portions of the shoreline upstream of approximately RM 16 and portions of the tributaries where the river is too shallow to safely navigate by boat and/or the presence of large rocks create a safety hazards. In these locations, the field survey will be conducted by field personnel on foot using a video camera to record continuous (as possible) video of the shoreline and recording observations according to the methods described in Section IV. The shoreline of these areas will be accessed at public-access points. Field personnel will wade in the shallow waters of the river in order to capture the shoreline on video. Where shoreline access or wading is not possible for video documentation, areas will be documented as much as possible using remote options (e.g., Google™ Earth) to fill in the shoreline descriptions.

VI. Video and Digital Photo Processing

A. Following the habitat identification survey, a time-stamped index of the video recording will be created so that specific river miles can be easily located in the recording.

B. An index of all digital photos taken will be created based on river mile, landmark, shoreline category, and habitat type, as appropriate.

V. References

Tierra Solutions. 1999. Passaic River Study Area ecological sampling plan. Work plan/field sampling plan. Volume 1 of 6. Tierra Solutions, Inc., Newark, NJ.

Windward. 2009. Lower Passaic River Restoration Project. Lower Passaic River Study Area RI/FS. Quality Assurance Project Plan: Surface sediment chemical analyses and benthic invertebrate toxicity and bioaccumulation testing. Final. Prepared for Cooperating Parties Group, Newark, New Jersey. Windward Environmental LLC, Seattle, WA.

Attachment S: LPRSA Habitat Identification Survey Form

Page ___ of ___

Surveyor(s): _____Date: _____ Time and height of low and high tides: _____

Starting point location (bank, landmarks): _____ End point location (bank, landmarks): _____

OBSERVATION LOG (NOTES TO ACCOMPANY NARRATIVE OF VIDEO RECORDING):

Date/ Time	Coordinates	Notes on Coordinates[a]	Record of Digital Photographs	Notes on Video Recording	Shoreline Category[b]	Notes on Human Access/Exposure[c]	Notes on Habitat[d]

[a] Record notes on location of coordinates (e.g., approximate boundary of upstream or downstream end of shoreline category, landmarks).

[b] Aquatic vegetation, mixed vegetation, bulkhead, or riprap.

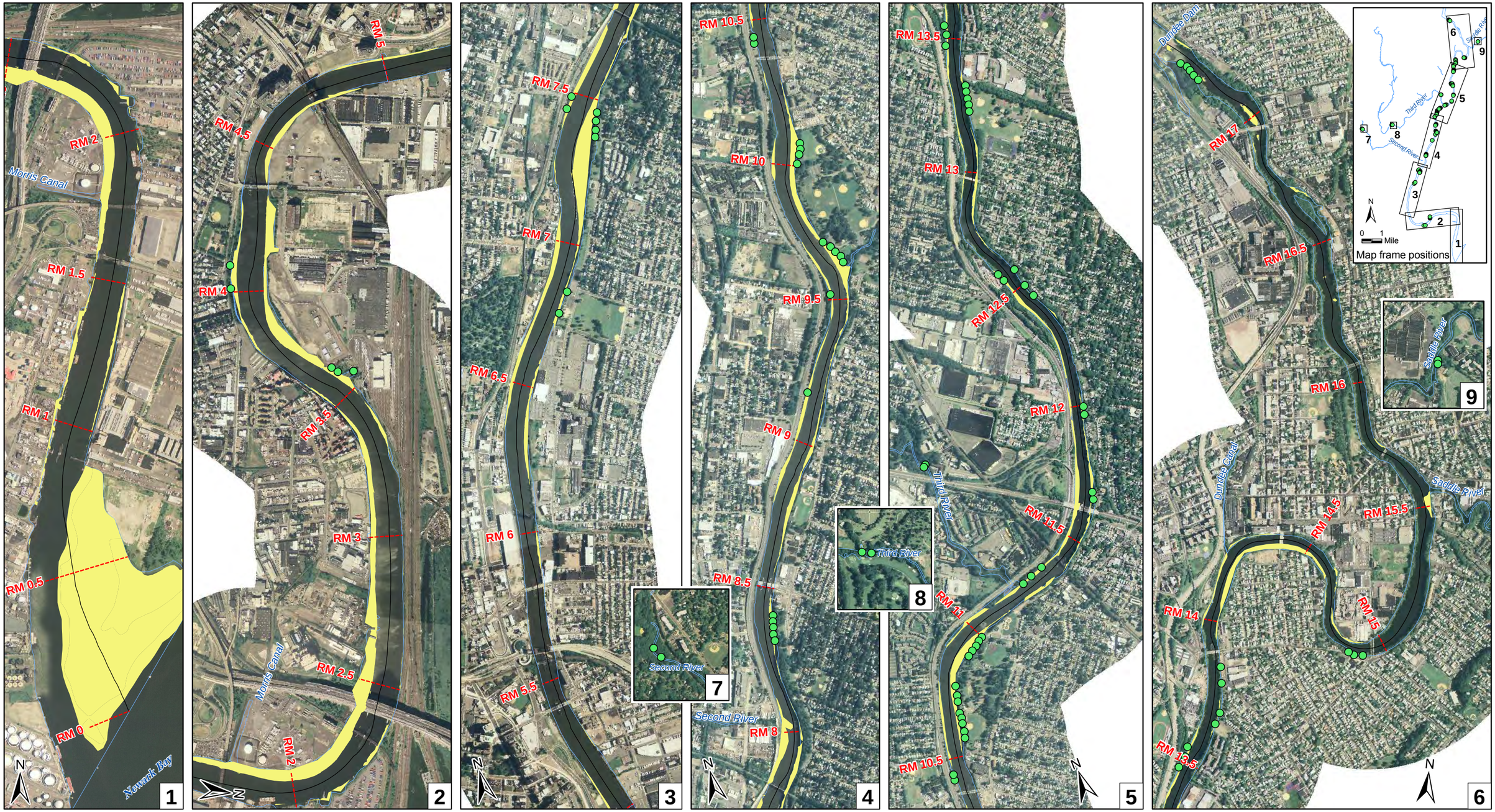
[c] Notes on human access/exposure may include:

- Characterization of accessibility of shoreline, such as the presence of fencing, buildings, infrastructure, or other features that may affect access.
- Characteristics of shoreline and intertidal areas, such as slope and substrate/composition, size of intertidal area at low/high tides; for bulkheaded shoreline, distance between top of bulkhead and river at low/high tides.
- Shoreline features, such as parks/green space, docks, boat ramps, benches, or other amenities.
- Evidence of human use or activities, including type of activity observed (e.g., fishing, boating), established paths/trails to or along shoreline, abutting residential properties with steps/access to shoreline.

[d] Notes on habitat may include:

- Identification of plant community types (e.g., emergent marsh, grassland, scrub-shrub, and/or mixed hardwood forest) and plant species (scientific and common names), where possible, for each stratum (i.e., herbaceous, shrub, or tree).
- Habitat features (e.g., large woody debris, snags, brush, overhanging vegetation, pools).
- Any observations of fauna made during the field survey or observations of whether identified habitat type is contiguous with floodplain habitats.
- Mudflat features such as slope and substrate.

Oversize Figures



Wind Ward environmental LLC

0 0.5 1 Kilometers

0 0.25 0.5 Miles

- USACE 2007 vegetation sampling plot
- River mile
- River centerline
- Mudflat/accessible sediment
- LPRSA

Accessible Sediment between RM 15 and Dundee Dam was estimated from CPG aerial photography (2007). Below RM 15 it was defined as > -2 MLW using the 2004 bathymetry, except in the area off Kearney Point, which was outside the survey area and was estimated from NOAA bathymetry.
Aerial photo: USGS High Resolution Orthoimagery for Coastal New Jersey, March 2006

Figure 1. Locations of mudflats and accessible sediment in the LPRSA

DRAFT

Prepared by LSM 3/22/10, map 4143, W:\Projects\06-58-01 Passaic RI\Data\GIS\Maps_and_Analysis\HabitatSurvey